

Spatially resolved defect spectroscopy with a microscopic beam

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We are developing a new defect analysis capability at the high current positron source at the Lawrence Livermore National Laboratory electron linac which now runs at 10^{10} e⁺s⁻¹. Development is underway of a low energy, .5 -50 keV, microscopically focused, <1 micron, pulsed, 100ps, positron beam for defect analysis by positron lifetime spectroscopy. This beam will enable defect specific, 3-dimensional maps of defect concentrations with sub-micron location resolution. When operational this instrument will enable new levels of defect concentration mapping and defect identification with the aid of first principles calculations of defect specific positron lifetimes. We will describe elements of the pulsed positron microprobe design and progress in its construction. Uses of the instrument in studying defect distributions in materials will be discussed.

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